

BROWNWATER LEVEE FOREST (BAR SUBTYPE)

Concept: The Bar Subtype of Brownwater Levee Forest is a middle stage of primary succession on relatively young point bar deposits. It is intermediate in between other Brownwater Levee Forest communities and Sand and Mud Bar, both temporally and spatially. Similar vegetation occurs in a narrow band along the riverbank in some places but is extensive enough to recognize as a community patch only in larger areas on the inside of point bars.

Distinguishing Features: The Bar Subtype is distinguished by dominance of tree species characteristic of primary succession, particularly *Platanus occidentalis*, *Betula nigra*, *Salix nigra*, *Salix caroliniana*, or *Acer saccharinum*. Most other species of Brownwater Levee Forest are present primarily as seedlings or saplings.

Synonyms: *Betula nigra* - *Platanus occidentalis* / *Alnus serrulata* / *Boehmeria cylindrica* Forest (CEGL007312).

Ecological Systems: Atlantic Coastal Plain Small Brownwater River Floodplain Forest (CES203.250). Southern Atlantic Coastal Plain Large River Floodplain Forest (CES203.066).

Sites: The Bar Subtype occurs on the insides of migrating meanders, where newly deposited material has accumulated high enough and stabilized enough to support trees but has not been stable long enough to have developed into another subtype of Brownwater Levee Forest.

Soils: Soils are recently deposited coarse alluvium that lacks horizon development. Patches are too small to distinguish in soil mapping but would presumably be some kind of Fluvent or Fluvaquent. They are subject to flood scouring and sediment deposition to a greater degree than other subtypes but less so than in Sand and Mud Bar. The substrate may be subject to reworking in floods but is relatively stable.

Hydrology: The Bar Subtype is seasonally to intermittently flooded. Its sites are lower and more frequently flooded than other subtypes of Brownwater Levee Forest but higher and less frequently flooded than most Sand and Mud Bar.

Vegetation: The vegetation of the Bar Subtype may have a closed or open tree canopy. Trees are generally relatively small and young, but a few individuals may be old, or significant tree cover may come from leaning large trees rooted in adjacent forests. Dominant species generally are *Platanus occidentalis*, *Betula nigra*, *Salix nigra*, or *Fraxinus pennsylvanica*, less often *Carya aquatica*, *Celtis laevigata*, *Acer negundo*, or on the Roanoke River, *Acer saccharinum*. *Carpinus caroliniana* may be present but there is no distinct understory. Other trees species are often present as seedlings or saplings. Shrubs are generally sparse. *Ilex decidua* is the only fairly frequent species in plot data (Peet and Rice 2001, Faestel 2002), but *Hibiscus laevis*, *Hibiscus moscheutos*, *Alnus serrulata* or *Cornus amomum* are sometimes observed. Vines are frequent in plots, especially *Toxicodendron radicans*, *Muscadinia rotundifolia*, and *Vitis cinerea* var. *floridana*, but don't generally have large cover. *Nemexia arborea*, *Smilax rotundifolia*, and *Campsis radicans* are fairly frequent. Herbs generally are sparse to moderate in density. As in Sand and Mud Bar, they may differ greatly in cover from year to year. Frequent species in plot data include *Pluchea camphorata*, *Boehmeria cylindrica*, *Echinochloa crus-galli*, *Leersia virginica*, *Erectites*

hieracifolia, *Commelina virginica*, *Coleataenia rigidula*, *Lindernia dubia*, and on the Roanoke, *Leersia oryzoides*, *Bidens discoides*, *Mollugo verticillata*, and *Oxalis dillenii*. Several species of *Carex* are frequent in plots from the Neuse and Cape Fear but not the Roanoke: *Carex tribuloides*, *Carex lousianica*, *Carex lupulina*, *Carex typhina*. Other fairly frequent species include *Commelina communis*, *Eclipta prostrata*, *Bidens bipinnata*, and *Bidens frondosa*. A great diversity of additional species may be present in small numbers or as seedlings. Exotic plants may be present, including *Murdannia keisak* and *Microstegium vimineum*.

Range and Abundance: Ranked G4G5. This subtype is scattered in North Carolina along the brownwater rivers in the upper to middle Coastal Plain but generally is absent downstream. Its overall frequency is not well known, as it often is overlooked in site descriptions. However, its overall extent is small. It may be largely absent on long stretches of rivers that are not actively meandering. Thus, it may be absent from most parts of the Roanoke and Cape Fear. The global range of this subtype also is unclear. The linked NVC association is reported to range to Kentucky, Arkansas, and Texas, but this almost certainly is because it has not been carefully considered and has been defined too broadly. Though the early successional condition may be conceivably be less differentiated than more stable floodplain forests, there is no reason to think it is uniform across such a wide geographic and physiographic range while other associations have much narrower ranges.

Associations and Patterns: The Bar Subtype occurs in small patches on the insides of meanders, generally between a Sand and Mud Bar and another subtype of Brownwater Levee Forest, though potentially adjacent to Cypress–Gum Swamp or Brownwater Bottomland Hardwoods. It is not present on all meanders.

Variation: Variation has not been well defined. The numerous differences in frequent species on different rivers, described above, may represent distinct variants. However, with the exception of a few species with biogeographic limits, such as *Acer saccharinum*, the differences may equally plausibly represent differences in the time of sampling or in types of areas selected for sampling.

Dynamics: The Bar Subtype is a community of middle primary succession on recently deposited landforms, with Sand and Mud Bar (Brownwater Subtype) representing the early stage and the other subtypes of Brownwater Levee Forest the climax stage. Though this general pattern appears obvious from spatial relationships and vegetation, the details of successional dynamics are not well known. It is driven by migration of meanders. This process is slow but not necessarily uniform. Much of the migration may occur in uncommon very large floods. Creation of bars may vary with rainfall cycles, such as those on a scale of 30 years documented by Stahle et al. (1988). The occurrence of a dry period after a wet period may lead to a temporary abundance of these mid successional communities.

Sand and Mud Bars do not steadily succeed to Brownwater Levee Forest. They appear to be maintained as sparse and young vegetation by scouring and reworking of their substrate and also by long and frequent flooding. Development of the Bar Subtype requires stabilization of the substrate, which appears to come about because of protection by more recently deposited bars. It also requires accretion to a higher elevation above the river, which may result from stabilization or may be a cause of it. The Bar Subtype remains more disturbed than higher parts of the

floodplain, and the vegetation often includes a significant component of ruderal species and of young individuals of herbaceous and woody species. This component can vary substantially from time to time. Eventually, the young individuals mature and the community succeeds to one of the other subtypes.

Upstream dams may have more impact on the dynamics of these communities than on most floodplain communities. Altered flood regimes can affect the dynamics of bar deposition and scouring. An artificially prolonged flood on the Roanoke River in 2003 appears to have resulted in mortality of most established trees on the lower banks and presumably on bars.

Comments: This subtype is less well understood than the other subtypes. It was documented by Rice and Peet (2001) and Faestal (2002) but is little reported in site surveys.

Populus deltoides - *Salix caroliniana* Forest (CEGL007343) and *Salix nigra* - *Fraxinus pennsylvanica* Forest (CEGL007734) are additional bar forest associations that have been attributed to North Carolina. The limited development of these communities and their natural variability does not appear to warrant such fine distinctions.

Rare species:

No rare species are known to be specifically associated with this community.

References:

- Faestal, M. 2012. Classification and description of alluvial plant communities of the North Carolina Coastal Plain. M.S. thesis, University of North Carolina, Chapel Hill.
- Rice, S.K., R.K. Peet, and P. Townsend. 2001. Gradient analysis and classification of the forests of the lower Roanoke River floodplain, North Carolina: a landscape perspective. Unpublished manuscript.
- Stahle, D.W., M.K. Cleaveland, and J.G. Hehr. 1988. North Carolina climate changes reconstructed from tree rings: A.D. 372-1985. *Science* 240:1517-1519.